Space Weather Forecast

Issued on Saturday, 23 September 2023 at 01:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated R1-R2 Minor/Moderate Radio Blackouts likely throughout. Risk of G1-G2 minor/moderate geomagnetic storms through the next four days, most likely 24 Sep (day 2).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate activity with four Moderate flares observed, the largest from the region in the centre disc peaking 22/2300 UTC. This is the largest of the twelve sunspot regions visible, and was also the source of a long lasting Moderate flare which peaked 03/0336 UTC, with a subsequent CME (coronal mass ejection) observed to the northeast. A further moderately sized sunspot, on the northwest disc complexified with a number of spots developing in it, producing a double peaked Moderate-flare, with peak 22/1715 UTC. Analysis of the associated CME is still underway. The other regions have remained less active. Further CMEs were also observed, however these are likely glancing Earth at most, or missing, or require further analysis.

Solar Wind / Geomagnetic Activity: Solar wind speeds have been mainly slightly elevated and steady through the period, persisting around 400 km/s. The total magnetic field strength was weak, with the important north-south component also weak, although most often pointed southward. Resultant geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no Solar Radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be at mainly Low to Moderate levels. The main risk of Moderate-class flares is from the large region close to east-centre disc and from a developing region in the northwest. These regions contain high magnetic complexity spots and are the main source of a risk of Strong solar activity.

Solar Wind / Geomagnetic Activity: CME arrivals are possible through much of the period, with the most significant from the long duration moderate flare on 22 Sep, likely arriving early on day 2 (24 Sep). Confidence is Low however, with further assessment ongoing of both this CME, other possible glancing impacts (including those from Moderate flares on recent days), and also further CMEs that occurred on the 22 Sep. Otherwise, Earth is expected to move into the fast wind of a coronal hole day 1 (23 Sep), with enhanced winds potentially persisting. Mainly Quiet geomagnetic activity at first, but with a risk of Unsettled to Active spells through much of the period and a risk of G1-G2 Minor to Moderate storms, most likely on day 2 (24 Sep). This may bring some visible aurora to northern UK early on the morning of 24 Sep (day 2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no Solar Radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	40	30	20
Strong	G3	No	5	10	5	1
Severe	G4	No	1	2	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	75	70	70	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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